

In the Specification<sup>1</sup>

*Kindly add the following new heading between lines 1 and 2 (i.e., after the title) at page 1 of the specification:*

BACKGROUND OF THE INVENTION

*Kindly rewrite the paragraph appearing at page 1, lines 2-6, to read as follows:*

B1  
This invention relates to a method and apparatus for processing a workpiece in which a plasma struck in the chamber is stabilized during the transition between steps, particularly, although not exclusively, steps in a cyclic process in the treatment of the workpiece.

*Kindly add the following new heading between lines 8 and 9 at page 2 of the specification:*

B2  
SUMMARY OF THE INVENTION

*Kindly rewrite the paragraph appearing at page 2, lines 20-21, to read as follows:*

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<sup>1</sup> A copy of any revised paragraphs of the specification showing additions and deletions thereto is attached as ATTACHMENT "A".

- B3 (c) stabilizing the plasma during the transition between the first and second steps.

✓  
*Kindly rewrite the paragraph bridging pages 2 and 3 of the specification to read as follows:*

B4  
Of course, more than two steps may be used in the treatment of the workpiece. When a cyclic process is used, the plasma is preferably stabilized between each cyclic step. The method is particularly applicable where a workpiece is treated by cyclically carrying out alternating etch and deposition steps.

✓  
*Kindly rewrite the paragraph appearing at page 3, lines 5-9, to read as follows:*

B5  
In one embodiment, the plasma may be stabilized by matching the impedance of the plasma to the impedance of the power supply which provides energy to the plasma by means of a matching unit. The given method of impedance matching is well known to those skilled in the art.

✓  
*Kindly rewrite the paragraph bridging pages 3 and 4 of the specification to read as follows:*

B6

The matching unit may be adjustable manually or electrically, although any suitable method of adjustment may be used. Preferably, when the plasma strikes, the plasma impedance is matched to the power supply impedance automatically for at least a part of the time of treatment of the workpiece. The matching unit may be pre-set to act in time at or just before the transition between the first and second steps, or indeed between all steps where more than two treatment steps are used. For example, in a switched etch/deposition process, the matching unit may be pre-set at or just before the transition between an etch step and a deposition step, or a deposition step and an etch step, in the cyclic process. In such an embodiment, the auto-matching may be re-enabled when the chamber pressure and/or other parameters have stabilized. In one embodiment, the automatic matching is disabled at or slightly before the transition. The pre-setting may be determined from a previous step of the same type in a cyclic process.

*Kindly rewrite the paragraph appearing at page 5, lines 15-25, to read as follows:*

B7

As an alternative to, or in addition to, the matching unit described above, the plasma may be stabilized by substantially preventing or reducing variation of the pressure in the chamber between the first and second steps. When this is used in relation to a cyclic etch/deposition process, the deposition gas may be supplied,

B7  
Contd

or increased in flow rate, before the etch gas is switched off, or reduced in flow rate, and the etch gas may be supplied, or increased in flow rate, before the deposition gas is switched off, or reduced in flow rate, during the cyclic process.

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Kindly rewrite the paragraph appearing at page 7, lines 3-13, to read as follows:

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B8

The plasma may be stabilized by feeding a further gas into the chamber. This "buffer" gas reduces the variation in the pressure from the first to the second step, for example. Thus, in a cyclic etch/deposition process, the buffer gas reduces the variation in the pressure between each etch and deposition step or vice versa. The gas may be fed into the chamber by means of a fast acting flow controller. The "buffer" gas may be any suitable gas, although is typically a noble gas (for example helium or argon), oxygen or nitrogen or a mixture thereof. A preferred "buffer" gas is helium.

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Kindly rewrite the two paragraphs appearing at page 8, lines 5-21, to read as follows:

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B9

According to a second aspect of the present invention, there is provided a plasma processing apparatus comprising a chamber having a support for a workpiece, means for striking a plasma in the chamber, means for cyclically

adjusting processing parameters between a first step and a second step, and means for stabilizing the plasma during the transition between the first and second steps.

The stabilizing means may comprise a matching unit for matching the impedance of the plasma to the impedance of a power supply which supplies power to the plasma. Alternatively, or additionally, the stabilizing means may comprise a means to vary the RF power supply frequency or may comprise means for reducing the variation of the pressure in the chamber between the first and second steps, for example means for feeding a gas into the chamber. This gas is the "buffer" gas described above.

*Kindly add the following new heading between lines 25 and 26 at page 8 of the specification:*

BRIEF DESCRIPTION OF THE DRAWINGS

*Kindly add the following new heading between lines 18-19 at page 9 of the specification:*

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

*Kindly rewrite the paragraph appearing at page 14, lines 6-10, to read as follows:*

b12  
Thus, in one embodiment, the invention discloses the pre-setting of the matching unit settings at, or just before, the switch from one step to the next, and then re-enabling the auto-match system when chamber pressure and/or other appropriate parameters have stabilized.

*Kindly rewrite the paragraph bridging pages 14 and 15 of the specification to read as follows:*

b13  
In detail, for a two step process involving a deposition step followed by an etch step followed by a further deposition step, a further etch step and then many repetitions of the sequence, it is assumed that the plasma has been struck initially and the description is of an arbitrary stage in the sequence. As the switch occurs to the deposition step, the matching unit settings are driven to pre-determined values that will be close to those required for stable plasma operation in the deposition step. After a period of time, related to the time that the chamber pressure, or other relevant parameter, takes to stabilize, the auto-matching facility is enabled to allow tracking of the plasma impedance. As the end of the deposition step is reached, the auto-matching is disabled and the matching unit settings are set to those required for the etch step. Again, after a pre-set period of time, based on the time that the chamber pressure, or other parameter, takes to stabilize, the auto-matching is re-enabled. The etch plasma impedance is then